Role of partnership and experimentation for the co-design of sustainable innovations: the case of farming systems of the West of Burkina Faso

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Abstract: *In the West of Burkina Faso, improving the integration of crop and livestock activities could allow to strengthen the productivity and sustainability of farming systems. But few of the technical propositions of agronomists were adopted and transformed into innovations by farmers. The TERIA project (2005-2007) tested a framework of Participative Action Research to co-design agropastoral innovations with farmers from the identification of problems to the experimentation of solutions. This project proposed a method to organize the partnership between the different stakeholders of the project and an original experimental framework. It allows building scientific knowledge on local practices and favouring the training of the stakeholders on contextualised techniques.*

Keywords: *action research, experimentation, innovation, farming system, Burkina Faso*

Introduction

For several decades, in villages of the cotton zone of western Burkina Faso, crop and livestock activities have increased without a real will to integrate them technically and geographically. The integration of crop and livestock activities seems however a prospect for improvement for the sustainability of farming systems and to contribute to draw aside an economic, ecological and social crisis (Vall et al., 2006). However the proposals and research models promoting this integration were little adopted, because they did not sufficiently involved stakeholders in identifying problems and developing solutions. TERIA project (founded by ATP CIROP CIRAD 2005-2007) aims at correcting these shortcomings by a Participative Action Research (PAR; Chia, 2004). This PAR is tested in Burkina Faso by agronomists of Cirad and Cirdes research centers in partnership with farmers and technicians of the villages involved in the study.

Methodology : Gouvernance of the partnership and experimentation

The study was carried out in Koumbia and Kourouma villages, located in the middle of the old cotton zone and characterized by a high population. The PAR framework was divided into 4 phases (Liu, 1997). The phase of "exploratory diagnosis" (2005) made it possible to determine the local agro-pastoral problems by a systemic approach validated with farmers. The phase of "general mutual commitment" (1st half of 2006) permitted to organize the partnership (Figure 1), to identify the ethical framework that specifies the shared values between the different stakeholders.

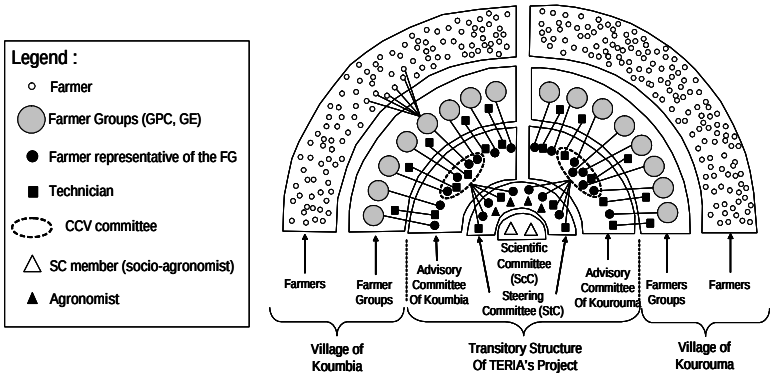

Figure 1. Partnership framework of project TERIA

This phase also allows specifying the global purpose of the project, its specific objectives, topics and the calendar of the experiments. The phase of "realization" (2006-2007) made it possible to produce knowledge and to innovate by experimentation on 3 topics:

1. Improved production and application of organic manure in order to improve the fertility of the fields
2. Improved use of draught animal and of agricultural residues (straw…) for the early installation of crops: rational feeding of draught animal, dry ploughing, mechanical sowing
3. Development of cash agro-pastoral activities: cattle fattening, dairy production

The "phase of assessment" will be carried out in 2008 and devoted to scientific and technical restitutions of the results.

Results: The case of cattle fattening during the dry season

Cattle fattening during the dry season is one of the alternatives of the topic 3 chosen by the CCV. Two trained farmers and two novice farmers were proposed to implement an experiment on this innovation. The Experimentation was a participative process divided into six stages:

1. mutual commitment: diary negotiated by the different partners of the experiment;
2. diagnosis and formulation of the problem: overall analysis of farmers' initial project (P0) that identified farmers' objectives involving in the experiment, the potentialities and drawbacks of their projects (Table 1);
3. collection of practical knowledge: learning of various techniques of cattle fattening (fattening of calves, of reformed animals…) by two visits on other villages;
4. study of the feasibility of the experimentation: improvement of the initial project (P0>P1) by a reformulation of the feeds and the commercial strategies, and by cost and price adjustments...;
5. implementation, follow-up and evaluation of the experimentation: the follow-up of the projects (P1>Pf) and their technical and economical evaluation highlighted an improvement of the performances for the trained farmers and of the definition of the project for the novice farmers;
6. restitution of the results: technico-economical references on cattle fattening were elaborated (Vall et Bayala, 2007).

Table 1: Technical and economical results of the experimentation

	Farmer A	Farmer B	Farmer C	Farmer D
Objectives : Nb of fattened animals	4	6	2	14
Potentialities of the project	Experience + livestock	Shepherd experience	Herd	Experience + herd
Drawbacks of the project	Feeding costs	Doesn't have any herd	Novice	Feeding costs
Gross margin/animal at P0 (€)	65	136	145	87
Gross margin/animal at P1 (€)	69	X	159	97
Gross margin/animal at PF (€)	64	X	112	135
Adjustments between P1 and P0	Feeding expenses	Projet defered until 2008 because of lack of credit	Animal prices and feeding expenses	Commercialisation and feeding expenses

Dicussion and Conclusion

This experimentation shows how novice farmers B and C learned to design a realistic project (B that realised that he was not ready abandoned his project and C decreased his expectations on prices). Producers A and D tested improved animal feeds that were less expensive. D adapted his commercial strategy and increased his gross margin. Researchers translate the analysis of the fattening projects, practices and strategies of adaptation into references published in a technical guide to be used by producers. The communication highlighted how the PAR framework gave to farmers (but also technicians) an active role in the problem identification, the design of solutions and their application. Consequently, this PAR allowed farmers' empowerment. Experimentation in this framework is a place of production of agronomical references on farmers' knowledge and know-how but also a learning device (Argyris et Schön, 2002). It contributes to the explanation of the studied situations and to the

feasibility of innovations (Liu, 1997) producing local drivable knowledge as defined by de Avenier et Schmitt (2007). Research involving many stakeholders, as it was presented in this framework, is not easy. It is based on a modification of researchers' position and the initiation of a learning process for farmers. It is a strake for this PAR framework that will favour the design of innovative and sustainable farming systems.

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